

Effects of Alimentation on the Development of some Pierinae.

By ORAZIO QUERCI.

In the studies in the biology of *Pieris rapae*, printed in this magazine, I related that their larvae generally died when the temperature reached to 90°. However, at the beginning of August, 1932, it was very hot at Philadelphia, for two consecutive days, and some larvae, which we were rearing, formed pupae instead of dying. Also in the open country the larvae were not injured and a few days after that heat-wave a large emergence occurred.

At Salonika, Greece, where we live now, I often spoke with my family about that matter, and my son-in-law, Dr. Enzo Romei, proposed to carry out some experiments to state the influence of alimentation on caterpillars. We put into an incubator, in different conditions, many larvae of *Pieris brassicae*, *Pieris rapae* and *Colias croceus*, and we saw that when the larvae are fed with luxuriant plants they grow and pupate very rapidly even if the temperature rises to 110° with very little aeration, moderate light and about 95 per cent of relative humidity. On the other hand, other larvae fed with some plants which we rarely sprinkled with water, rotted at about 90°. They become very active when the heat increases and an excess of unsuitable food produces their death.

This experiment explains the behaviour of the larvae at Philadelphia where, in 1932, the food plants were always more or less verdant for the whole season. Looking at what I related in the *Ent. Rec.*, XLVII, 1935, we see that the larvae died, on 6th June, because the temperature increased while the vegetation was almost dry (p. 47). From 12th to 17th June it rained and the caterpillars were little injured by the waves of heat of the 22nd and 26th, but they died on 1st July as it was hot when the country had turned barren (p. 61). The mortality was considerable, for lack of rain, until 20th July (p. 74) and the butterflies on the wing were scarce from 26th July to 10th August (p. 87). On 3rd August it rained even during the night, the heat was moderate for two days and the vegetation recovered. The high temperature of 5th to 10th August did not affect the well fed larvae in the country (p. 87) and there the butterflies were plentiful until 5th September (pp. 112 and 125). In August the result of our breedings was poor, not for the cause which I relate in my paper (p. 87), but because sometimes, instead of getting plants in the meadows of the Parkway, we used the *Lepidium virginicum*, growing near home, which was injured by the dust of the street.

By the end of August the vegetation faded and it was still more damaged by the short shower of the 27th which dried at once from the effect of the intense heat and strong wind (p. 112). At the beginning of September it was hot, the unsuitable food killed most caterpillars and the butterflies were very scarce from 7th to 16th September (p. 125). Looking at the specimens taken on those days, which are in my set, I see that most of them are worn.

On 5th and 6th September it rained and afterwards the climate was lovely. The *Lepidium virginicum* bloomed again and the mortality of larvae ceased for some time. Many *Pieris* were on the wing from 18th to 25th September (p. 125), but after 16th September the decay

of vegetation caused the death of most caterpillars and, by the end of that month and later on, the Lepidoptera became scarce in the country.

Speaking about *Pieris brassicae*, in the *Ent. Rec.*, XLVIII, p. 38, 1936, I related that all our larvae rotted at Lisbon, Portugal, when the temperature rose to 89°, however, at p. 40 of the same paper, I remarked that the figures which I recorded as to be the limits of activity and vitality of the larvae were not absolute as I supposed that other factors, besides temperature and humidity, would affect the larval stage. Now, having seen that the larvae of that species live quite well at 110°, I have inquired about the real cause of their sudden death and, in my note-book, I have read that, on 16th May, 1933, we were unable to go to Mata do Alfeite and get plants, where cabbage grew in a moist place, and took some leaves in the dusty Park Edward VII, near home. Our larvae, being excited by heat, fed actively and rotted.

After many years research, making and revising mistakes, I can now state, with the support of many experiments, that in the Temperate Zone heat can not cause death of larvae of butterflies until the quality of food is unsuitable. In summer the control of abundance is made directly by alimentation, and the climatic factors have a great but indirect influence.

Random Notes on Argentine Collecting.

2.—An Unproductive Winter Expedition.

By KENNETH J. HAYWARD, F.R.E.S., F.R.G.S., F.Z.S.

In the late autumn of 1933, a telegram from the Argentine Ministry of Agriculture offered me the leadership of an exploring Commission they were about to send out to examine certain territory for signs of wintering locusts, the *Schistocerca paranensis*, Burm., whose enormous invasions during the last few years have caused such grave alarm in the country.

Four days later, I had arrived back in Buenos Aires, and after some fifteen days of hectic preparation, the expedition left on the evening of 24th May for the city of Córdoba, where we had to spend one day awaiting suitable train combinations. On the 26th we left for Serrezuela in the west of the province of Córdoba, which I had selected as the jumping off place, myself going right through to La Rioja to pay certain official calls, returning on the 28th to join the remainder. Some days were spent awaiting the remaining personnel, arranging and hiring transport, overhauling the somewhat alarming amount of baggage we perforce carried, and in exploring the northern end of the Sierras de Serrezuela.

As soon as possible we commenced the exploration of the ground allotted us, an area comprising the whole of the province of La Rioja, the northern portions of San Juan and San Luis, the west of Córdoba and the extreme south of Catamarca, an area equal to that of England and Wales. The greater portion of this area consists of isolated mountain ranges lying before the pre-cordilleras, including the Famatina group crowned by the Cerro Oveño, 22,500 feet, the isolated ranges in many cases reaching 10,000 feet. The object of the expedition was to survey this area for any signs of overwintering locusts and to collect